

# Edexcel GCE

## Core Mathematics C2

### Advanced Subsidiary

# Logarithms

**Materials required for examination**  
Mathematical Formulae (Pink or Green)

**Items included with question papers**  
Nil

#### **Advice to Candidates**

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You must ensure that your answers to parts of questions are clearly labelled.  
You must show sufficient working to make your methods clear to the Examiner.  
Answers without working may not gain full credit.

1. Solve

(a)  $5^x = 8$ , giving your answer to 3 significant figures,

(3)

(b)  $\log_2(x+1) - \log_2 x = \log_2 7$ .

(3)

a)  $\log_5 8 = \underline{1.29}$  (3sf)

b/  $\log_2 \left( \frac{x+1}{x} \right) = \log_2 7$

$$\frac{x+1}{x} = 7$$

$$x+1 = 7x$$

$$1 = 6x$$

$$\underline{\underline{x = \frac{1}{6}}}$$

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2. Solve the equation  $5^x = 17$ , giving your answer to 3 significant figures.

(3)

$$\log_5 17 = \underline{1.76}$$
 (3sf)

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3. (a) Find, to 3 significant figures, the value of  $x$  for which  $5^x = 7$ .

(2)

(b) Solve the equation  $5^{2x} - 12(5^x) + 35 = 0$ .

(4)

a/  $\log_5 7 = \underline{1.21}$  3sf

b/  $(5^x - 7)(5^x - 5) = 0$

$$5^x = 7 \quad 5^x = 5$$

$$\underline{\underline{x = 1.21}} \text{ (3sf)} \quad \underline{\underline{x = 1}}$$

4. (i) Write down the value of  $\log_6 36$ .

(1)

(ii) Express  $2 \log_a 3 + \log_a 11$  as a single logarithm to base  $a$ .

(3)

i/ 2

ii/  $2 \log_a 3 + \log_a 11$   
 $\log_a 3^2 + \log_a 11$   
 $\log_a (9 \times 11)$   
 $\log_a 99$

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5. (a) Find, to 3 significant figures, the value of  $x$  for which  $8^x = 0.8$ .

(2)

(b) Solve the equation

$$2 \log_3 x - \log_3 7x = 1.$$

(4)

a/  $\log_8 0.8 = \underline{\underline{-0.107}}$  (3sf)

b/  $2 \log_3 x - \log_3 7x = 1$   
 $\log_3 x^2 - \log_3 7x = 1$   
 $\log_3 \left( \frac{x^2}{7x} \right) = 1$

$$\frac{x^2}{7x} = 3$$

$$x^2 = 21x$$

$$x^2 - 21x = 0$$

$$x(x - 21) = 0$$

$$\underline{\underline{x = 0}} \quad \underline{\underline{x = 21}}$$

6. Given that  $a$  and  $b$  are positive constants, solve the simultaneous equations

$$a = 3b,$$

$$\log_3 a + \log_3 b = 2.$$

Give your answers as exact numbers.

$$\begin{aligned} \log_3 ab &= 2 & (6) \\ ab &= 3^2 \\ ab &= 9 \\ a &= \frac{9}{b} \end{aligned}$$

$$\begin{aligned} \frac{9}{b} &= 3b \\ 9 &= 3b^2 \\ 3 &= b^2 \\ \underline{\underline{b = \pm\sqrt{3}}} & & \underline{\underline{a = \pm 3\sqrt{3}}} \end{aligned}$$

7. (a) Find the value of  $y$  such that

$$\log_2 y = -3.$$

(2)

- (b) Find the values of  $x$  such that

$$\frac{\log_2 32 + \log_2 16}{\log_2 x} = \log_2 x.$$

(5)

$$a/ \quad 2^{-3} = \underline{\underline{\frac{1}{8}}}$$

$$b/ \quad \log_2 \left( \frac{32 \times 16}{x} \right)$$

$$\frac{9}{\log_2 x} = \log_2 x$$

$$9 = (\log_2 x)^2$$

$$\pm 3 = \log_2 x$$

$$\begin{aligned} x &= 2^3 & x &= 2^{-3} \\ &= \underline{\underline{8}} & &= \underline{\underline{\frac{1}{8}}} \end{aligned}$$

8. Given that  $0 < x < 4$  and

$$\log_5(4-x) - 2 \log_5 x = 1,$$

find the value of  $x$ .

$$\log_5 \left( \frac{4-x}{x^2} \right) = 1 \quad (6)$$

$$\frac{4-x}{x^2} = 5$$

$$4-x = 5x^2$$

$$0 = 5x^2 + x - 4$$

$$0 = (5x-4)(x+1)$$

$$x = \frac{4}{5} \quad x = -1$$

$$0 < x < 4 \quad \therefore \underline{\underline{x = \frac{4}{5}}}$$

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9. Find, giving your answer to 3 significant figures where appropriate, the value of  $x$  for which

(a)  $3^x = 5,$

(3)

(b)  $\log_2(2x+1) - \log_2 x = 2.$

a)  $\log_3 5 = \underline{\underline{1.46}}$  (3sf)

(4)

b)  $\log_2 \left( \frac{2x+1}{x} \right) = 2$

$$\frac{2x+1}{x} = 4$$

$$2x+1 = 4x$$

$$1 = 2x$$

$$\underline{\underline{x = \frac{1}{2}}}$$